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A REVISION OF THE FISHES OF THE GENUS *NOTOTHENIA* FROM THE NEW ZEALAND REGION, INCLUDING MACQUARIE ISLAND[1]

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INTRODUCTION

While preparing a revision of the southern and Antarctic fishes of the genus *Notothenia*, it became evident that the taxonomy of the species found in the New Zealand region is confused. In the most recent review (Parrott, 1958), five species are identified as occurring there. Of these, only four are valid, only three of the four are found in the New Zealand region, and the nomenclature of the three is entirely confused. This should not reflect upon Parrott, for he followed Boulenger, Waite, Regan, and Norman. For these reasons it is timely to present new descriptions and a new key for the New Zealand species together with a clarification of the nomenclatural confusion which has surrounded them.

I include Macquarie Island in this paper because two of the three species of *Notothenia* recorded from there also occur in New Zealand waters. Further, *Notothenia coriiceps* is included in the key to the species because it is widely distributed in the Southern Ocean, is known from the Kerguelen Islands, and eventually also may be found at Macquarie Island; a description of it is not given.

[1] Contribution number 15 from the Marine Science Institute of the University of South Florida.

I have not included *Notothenia cornucola* in this revision because I do not believe it occurs at New Zealand. This species was early recorded from New Zealand waters (Günther, 1860; p. 262; Hutton, 1872; p. 26; 1873; p. 262) and continues to be included in lists of New Zealand fishes although no specimens identified as *N. cornucola* have been found for nearly 100 years. The most recent reference is Parrott (1958), who admits that its occurrence is doubtful, although he includes it in his key to the New Zealand species of *Notothenia*. Considering that specimens of *N. cornucola* are encountered most commonly in littoral and shallow inner sublittoral areas (for example, among and under the rocks of the beaches near Punta Arenas, Chile, at low tide), it seems likely that if the species actually occurred in the New Zealand region it would be well known there. Norman (1937b; p. 86) reviewed the evidence and concluded that it ". . . is very slender." The specimen recorded by Günther was probably mislabeled, and Hutton's 1872 record is probably based upon that of Günther. Hutton's 1873 record from the Chatham Islands was probably based upon specimens of *N. angustata*. This species has recently been collected there (Moreland, 1957) and I have seen the specimens (see the section on material examined under *N. angustata*). Further, Hutton's (1873) statement that the upper lateral line ". . . extends to the end of the second dorsal, . . ." agrees best with my observations of *N. angustata* rather than with *N. magellanica*, the species to which Norman believed Hutton referred. For these reasons I have included Hutton's 1873 reference to *N. cornucola* in the synonymy of *N. angustata*. I have not included the listings of *N. cornucola* Richardson found in the lists and catalogues of New Zealand fishes because, in that form, they refer to a species which I believe does not occur in New Zealand.

Several check lists of New Zealand fishes have been prepared at various times, some of which I have not seen. The most important are those by Gill (1893), which reviews in detail the earlier works, and by Phillipps (1927b) which refers to earlier lists. For lists that I have seen, I have included the references to *Notothenia* species in the synonymies according to my present interpretations of the names used. For example, the name *Notothenia microlepidota* is listed under that species even though during that period the name was used in reports on collections for specimens properly called *N. angustata*.

MUSEUM ABBREVIATIONS

In preparing my descriptions I have utilized specimens from the collections of museums whose names are abbreviated in the lists of material examined as follows.

BMNH: British Museum (Natural History), London.

CM: Canterbury Museum, Christchurch, New Zealand.

DM: Dominion Museum, Wellington, New Zealand.

MACN: Museo Argentino de Ciencias Naturales, Buenos Aires.

MLP: Museo de La Plata, La Plata, Argentina.

NMV: Naturhistorisches Museum, Vienna.

PM: Muséum National d'Histoire Naturelle, Paris.

SAM: South Australian Museum, Adelaide.

SU: Division of Systematic Biology, Stanford University, Stanford, California.

USC-*Eltanin*: material collected by the University of Southern California Antarctic Biological Research Program from the USNS *Eltanin*.

USNM: United States National Museum, Washington, D.C.

ZIL: Zoological Institute, Leningrad.

ZMB: Zoologisches Museum, Humboldt-Universität, Berlin.

MEASUREMENTS AND COUNTS

All measurements were made in a straight line with calipers, and are presented in the descriptions as thousandths of the standard length unless otherwise specified. All were made on the left side unless there was a deformity or loss which necessitated using the right side. Lateral line and pectoral fin counts were usually made on both sides. Those measurements which are not usually made, or which have been made differently in the past, are defined in the following alphabetical list.

Anal to Pelvic Distance: from base of pelvic spine to origin of anal fin.

Body, Depth of: measured at origin of anal fin.

Body, Width of: measured at thickest part of body above origin of anal fin.

Dorsal Interspace: distance between base of last spine of first dorsal fin and first ray of second dorsal fin.

Dorsal to Anal Distance: distance between origins of second dorsal and anal fins.

Dorsal to Caudal Distance: distance between last ray of second dorsal fin and midbase of caudal fin.

Head, Depth of: measured at vertical through cheeks.

Head, Length of: measured from tip of snout (upper jaw) to posteriormost edge of opercular flap.

Head, Width of: distance between cheeks.

Pectoral Fin, Length of: measured from base of uppermost ray to tip of posteriormost extending ray.

Pectoral to Pectoral Distance: distance between upper ends of bases of pectoral fins.

Pelvic Fin, Length of: measured from base of pelvic spine to tip of posteriormost extending ray.

Post Orbital Distance (*Postorbital Part of Head*): measured from posterior margin of orbit to posteriormost edge of opercular flap.

Standard Length: measured from tip of upper lip to midbase of caudal fin.

Upper Jaw, Length of: measured from tip of upper lip to posterior end of maxillary.

The counts for the caudal fin include all the branched rays plus 1 additional ray above and below, *i. e.*, the branched rays plus 2. The last ray elements in the second dorsal and anal fins are counted separately. The scales in a lateral longitudinal series are counted from the upper end of the base of the pectoral fin to the base of the caudal fin. Gill raker counts are given as follows: 6–9 + 0–1 + 12–17 = 18–26. This means that there are a total of 18–26 gill rakers, of which 6–9 are on the upper limb, none or 1 at the angle, and 12–17 on the lower limb. On each arch, except occasionally the fourth arch, there are 2 rows of gill rakers, one projecting anteriorly and the other posteriorly. These are called, respectively, the anterior and posterior series. The lateral lines and their counts as well as the terminology of the cephalic canals have already been described (DeWitt, 1962).

GENUS *NOTOTHENIA* RICHARDSON

A formal diagnosis of the genus will be presented elsewhere. The following characters serve to distinguish it from other genera of New Zealand marine fishes. The nostrils are tubular and single on each side; the New Zealand species have the hind margin of the tube extended into a flap. The gill membranes are joined to each other and to the isthmus, forming a free fold across the isthmus. The vomer and palatines are edentulous. Two dorsal fins are present, the first composed of 3–8 spines which are usually soft and flexible, the second long and composed of soft rays. The anal fin is similar to the soft dorsal fin. The pectoral fins have broad, almost vertical, slightly curved bases. The body is scaled; the head is nearly naked in the New Zealand species. The scales may be ctenoid or nonctenoid, with both types usually present. Two lateral lines are present on the body, one high near the bases of the dorsal fins, the other on the midside in the region of the caudal peduncle. In the New Zealand species the head is somewhat depressed, and the interorbital space and the top of the head are broad and flat.

KEY TO THE SPECIES

1a. Lateral scales 78–99; middle lateral line 24–37; upper lateral line 61–75; 15–19 gill rakers on lower limb of first gill arch; total number of gill rakers on first arch 24–30 ..... *N. microlepidota*, p. 325.

1b. Lateral scales 73 or less; middle lateral line 23 or less; upper lateral line 30–61; 8–15 gill rakers on lower limb of first gill arch; total number of gill rakers on first arch 15–23 ..... 2.

2a. (from 1b). Pectoral rays 21–24 ..... *N. rossii*, p. 312.

2b. Pectoral rays 16–19 ..... 3.

3a. (from 2b). Second dorsal fin with 35–41 rays; anal fin with 26–32 rays ..... *N. coriiceps*.

3b. Second dorsal fin with 27–31 rays; anal fin with 22–26 rays ..... 4.

4a. (from 3b). Upper lateral line with 36–48 tubular scales; total number of scales in upper and middle lateral lines 45–57; length of caudal peduncle 37.0–45.5 percent of head length; preoperculo-mandibular canal not connected with the temporal canal; dorsal surface of head without prominent ridges ..... *N. magellanica*, p. 303.

4b. Upper lateral line with 45–61 tubular scales; total number of scales in upper and middle lateral lines 59–76; length of caudal peduncle 25.5–34.5 percent of head length; preoperculo-mandibular canal connected dorsally with the temporal canal; in larger specimens prominent ridges present on top of head extending from above each eye posteriorly onto temporal region ..... *N. angustata*, p. 318.

Notothenia magellanica (Forster).

Gadus magellanicus FORSTER, in Bloch and Schneider, 1801: 10–11 (original description; type locality seas about Tierra del Fuego; no types preserved, description based upon notes taken from fresh specimens and an unpublished rough drawing); FORSTER, 1844: 361–362 (description); RICHARDSON, 1846: 61 (listed in footnote, see under *Lota magellanica,* below).

Notothenia magellanica RICHARDSON, 1844: 9 (counts with reference to illustration: "Icon. ined. Bibl. Banks. fig. 178," catalogued in British Museum (Natural History) in Banksian MSS. no. 6 & 7); GILL, 1862: 520 (listed).

Lota magellanica RICHARDSON, 1846: 61 (possibly a mistaken generic assignation[2]); GILL, 1862: 520 (listed).

Notothenia magellanicus GÜNTHER, 1860: 260 (listed).

Notothenia magellanicuz DELFIN, 1899a: 21 (listed).

Notothenia macrocephalus GÜNTHER, 1860: 263 (original description; type locality Falkland Islands; type in British Museum); GILL, 1862: 520 (listed); CUNNINGHAM, 1871: 470 (color notes); PERUGIA, 1891: 618–619 (description); SMITT, 1897; 9–12, pl. 3, figs. 23–26 (description, scales); BOULENGER, 1900: 53 (listed).

Notothenia maoriensis HAAST, 1873: 276, pl. 16 (original description; type locality near Lyttleton Harbour, New Zealand; present location of type unknown, probably lost); HUTTON, 1876: 212–213 (description); HUTTON, 1890: 279 (listed); GILL, 1893: 118 (listed); WAITE, 1907: 29 (listed); FROST, 1928: legend for pl. 17, fig. 15 (otolith).

Notothenia antarctica PETERS, 1876: 837 (original description; type locality Accessible Bay, Kerguelen Island; type in Zoologisches Museum, Humboldt-Universität, Berlin).

Notothenia antarcticus STUDER, 1879: 131 (listed; color notes).

Notothenia hassleriana STEINDACHNER, 1876: 69–70, pl. 6, left-hand figures (original description; type localities Puerto Bueno and Port-Gallant, both in Strait of Magellan; types in Naturhistorisches Museum, Vienna); STEINDACHNER, 1898: 303 (listed).

Notothenia arguta HUTTON, 1879: 339 (original description; type locality Campbell Island; type in British Museum); HUTTON, 1890: 280 (listed); GILL, 1893: 118 (listed); WAITE, 1907: 30 (listed).

Notothenia macrocephala GÜNTHER, 1881: 20 (listed); VAILLANT, 1888: 27, pl. 3, figs. 2a–d (listed, illustrations); BOULENGER, 1902: 186 (listed); STEINDACHNER, 1903: 207 (listed); DOLLO, 1904: 86 (listed, distribution); LÖNNBERG, 1907: 10 (listed, color notes); REGAN, 1913: 277 (description, distribution); HUSSAKOF, 1914: 89 (listed with counts); WAITE,

[2] In his description of *Lota breviuscula*, Richardson compares *L. breviuscula* with several other species, among which is "*Lota magellanica* of Forster." In a footnote he lists the species and gives some data for each. Here Forster's species is listed as *Gadus magellanicus*, with the following counts: B. 6; D. 5–31; A. 25; C. 14; P. 17; V. 6. These counts are identical with those given in Forster (in Bloch and Schneider, 1801: 11; 1844: 362) and Richardson (1844: 9) under *Gadus magellanicus*, except that Richardson does not give an anal fin count. It seems obvious that both *Lota magellanica* and *Gadus magellanicus* refer to the same fish, but the reason for the use of *Lota* is unclear to me.

1916: 66–69, pl. 3, fig. 2 (description, illustration); Thompson, 1916: 431–433 (description); Regan, 1916: 378–379 (distribution); Phillipps, 1921: 123 (listed); Thompson and Anderton, 1921: 94 (listed, synonymy); Rendahl, 1925: 6 (listed); Phillipps, 1927a: 13 (listed); Phillipps, 1927b: 44 (listed); Frost, 1928: 454–455, pl. 17, fig. 15 (otolith); Norman, 1937b: 88–90 (description, illustration, distribution); Norman, 1938: 27 (distribution); Oliver Schneider, 1943: 110 (listed, illustration); MacDonagh and Covas, 1944: 235–236 (description, distribution); Fowler, 1945: 128–129 (listed); Hart, 1946: 339 (pelagic young); Fowler, 1951: 314 (key); Andriashev and Tokarev, 1958: 199 (listed); Andriashev, 1959: 5 (vertebral count); Blanc, 1961: 124 (description); Kenny and Haysom, 1962: 252 (habitat, food); Slack-Smith, 1962: 14 (color notes, habitat, food).

Material examined. USNM 77329: Sandy Point (Punta Arenas), Strait of Magellan, 53°10′S., 70°55′W. (1; 183 mm.).

USNM 88755: Municipal jetty (Port Stanley?), Falkland Islands (1; 193 mm.).

USNM 88756: Mullet Creek, Falkland Islands, 51°44′S., 57°53′W. (2; 51.9 and 55.3 mm.).

USNM 171000: Kainan Bay, Ross Sea, Antarctica, 78°14′S., 161°55′W. (1; 229 mm.).

SU 59880: Macquarie Island (3; 48.0–169 mm.).

SU 59882: Macquarie Island (2; 139 and 168 mm.).

BMNH 1860.2.20.2: Falkland Islands (1, a skin; holotype of *N. macrocephala*).

BMNH 1886.11.18.28: Campbell Island, from Otago Museum, Dunedin, New Zealand (1; 150 mm.; type of *N. arguta*).

ZMB 21626: Deutsche Tiefsee-Expedition Station 123, 49°07′S., 08°40′E.; bottom depth 4418 m.; presumably taken at surface in a plankton net, 22 November, 1898 (1; 80.2 mm.).

NMV 59926: Port Gallant (Puerto Gallant), 53°40′S., 71°58′W., field no. 1203a (1; 86.0 mm.; lectotype of *N. hassleriana*).

NMV 65389: Puerto Bueno, 50°59′S., 74°12′W., field no. 1203b (1; 87.0 mm.; paralectotype of *N. hassleriana*).

MACN 1859: Punta Colnet (Cabo Colnett, 54°43′S., 64°20′W.), 17 fathoms (1; standard length not measured).

MACN 2673a: Bahia Tethis (Tierra del Fuego), (1; 155 mm.).

ZIL (no number): Transvaal Cove, Marion Island, about 2 meters (2; 189 and 216 mm.).

ZIL (no number): Scotia Sea, 60°38′S., 44°08′W., bottom depth 287 m.; depth of capture 0–60 m.; gear Isaacs Kidd trawl; at *Academician Knipowich* Station 85 (1; 261 mm.).

CM (no number): South Island, New Zealand, probably near Dunedin (1; 137 mm.).

I have also examined specimens deposited in New Zealand museums (all

uncatalogued) from the following localities. DM: Campbell Island, from Camp and Garden coves after tidal wave. CM: Campbell Island; Tucker Cove, Campbell Island; Penguin Harbour, Campbell Island; Perseverance Harbour, Campbell Island; Macquarie Island, 17 fathoms.

Description. Body evenly curved both dorsally and ventrally from head to base of caudal fin; compressed posteriorly, becoming broader and more rounded toward head; greatest depth of body at about origin of second dorsal fin; depth of body 208–282, its width 122–150; pectoral to pectoral distance 144–225; dorsal to anal distance 237–306. Caudal peduncle longer than deep, its length 107–135, its depth 93–102; dorsal to caudal distance 104–138. Head slightly shorter than average for genus, its length 280–320; its width, 146–248, about equal to its depth, 198–224. Vertebrae 16–18 + 28–30 = 45–47.

Snout very bluntly rounded from dorsal view; from lateral view it rises steeply from tip of upper jaw to a point a little above and anterior to nostrils, where it becomes abruptly less steep; its length 82–102. Tubes of nostrils short, with posterior rim raised into a flap which may be folded over opening; placed 52–79 from tip of snout, 17–29 from orbit and 52–75 apart. Eyes placed high on sides of head, but below dorsal profile; diameter of orbit 58–96. Interorbital region very broad and flat, its least width 88–134; all of top of head, from posterior part of snout to occipital region, nearly straight and rising slightly posteriorly; length of postorbital part of head 141–176.

Jaws short but wide, maxillary extending posteriorly to about vertical from pupil of eye; length of upper jaw 94–115. Teeth in each jaw in two almost uniserial bands; those in outer bands much larger and more numerous than those of inner bands and extend full length of jaws; inner bands confined to anterior ½ or less of jaws. The numbers of teeth vary, for in some individuals the bands are almost entirely uniserial, whereas in others they may become essentially double for part of their length. Oral valves extend most of length of each jaw, the lower broadest; their exposed surfaces covered with coarse papillae, especially close behind inner bands of teeth. Tongue fleshy and densely covered with short, slender papillae which may be covered by a mucous coating and appear as low rounded papillae.

Anterior gill rakers of first gill arch nondentigerous, or occasionally with 1 to a few spines, the larger ones flattened, arranged 3–6 + 1 + 9–13 = 14–19. Posterior gill rakers of first arch dentigerous, arranged 0–1 + 0–1 + 10–15 = 12 – 16. Gill rakers of remaining arches all dentigerous; 1–11 in posterior series of fourth arch. Branchiostegal rays 6; pseudobranchiae curved ventralward posteriorly.

First dorsal fin 3–6, originating 306–343 from tip of snout, from just behind to just in advance of upper end of base of pectoral fin; lower than second dorsal fin, second or third spine longest, 67–99. Second dorsal fin 29–31, origi-

nating 396–437 from tip of snout, 25–65 behind base of last spine of first dorsal fin; length of sixth ray 125–171, of sixth from last ray 87–105. Membrane behind last spine of first dorsal fin may reach to base of first ray of second dorsal fin. Anal fin 22–26, originating 513–606 from tip of snout, below bases of rays 8–10 of second dorsal fin; length of sixth ray 103–134, of sixth from last ray 82–98. Caudal fin 14–16, its length 165–242; its posterior margin changes shape considerably with size, being deeply forked in very small individuals and becoming emarginate or even slightly rounded in larger specimens.

Pectoral fins 16–18, their length 222–275, extending posteriorly to above bases of rays 1–8 of anal fin; width of their bases 81–88. In larger specimens (100 mm. or more) the upper rays are longest and cause the posterior margin to be obliquely truncate or slightly falciform; the lower posterior margin is rounded. Pelvic fins rather short, their length 166–216, third rays longest, not reaching posteriorly to base of anal fin; inserted 232–312 from origin of anal fin, not entirely to entirely in advance of bases of pectoral fins.

Upper lateral line 36–46, separated from origin of second dorsal fin by 6–10 scale rows, ending below rays 3–6 from last of second dorsal fin; middle lateral line 5–14. The pores of the cephalic canals are small and often difficult to see, but are otherwise normal. Preoperculo-mandibular canals with 10–11 pores; infraorbital canals with 8–9 pores; supraorbital canals each with 4 pores and sharing a median coronal pore; temporal canals with 6 pores; supratemporal canal with 3–4 pores.

Most scales on body nonctenoid, 47–64 in a lateral longitudinal series, 23–28 rows around caudal peduncle; ctenoid scales present in area of sides covered by appressed pectoral fins. These latter have a single row of weak teeth along the posterior margin which is vertical and straight and may be recessed into the scale. There may be also a few weak projections on other scales of the body. Scales extend onto base of caudal fin and exposed bases of pectoral fins. Medial bases of pectoral fins, including small portions of body posterior to bases, naked; a small scaleless area also present on exposed side just anterior to base of rays. Head nearly entirely naked; small patches of scales present behind eyes, on uppermost part of operculum, and at postero-lateral parts of top of head. Round fleshy papillae cover remainder of top of head, and are present around lower and posterior parts of eyes, on snout, opercles, and sometimes on skin covering posterior parts of maxillaries.

The color patterns of preserved specimens seem to vary considerably. Most of the specimens examined show no striking patterns anywhere, being darker above (bluish-grey to warm brown) shading to paler ventrally. The vertical fins are dusky, with pigment on both rays and membrane in the dorsal and anal fins, but mainly on the rays in the caudal fin. The pectoral fins are more or less dusky, being darkest in the more recently caught specimens. However, the 2

specimens from Marion Island in the collection of the Zoological Institute in Leningrad have a strikingly different coloration. Overall they are brown, darker above, lighter below, with small spots and mottlings, more or less distinct, on the upper parts of the body. There are very clear spots and vermiculations on the top and sides of the head, including, in the larger specimen, most of the snout and the upper medial part of the upper lip. Rather irregular spots and stripes are present on the dorsal and caudal fins, and there is faint spotting of the upper pectoral rays in the larger specimen. This spotted coloration is very similar to that found on most specimens of *N. angustata*. Norman (1937b) adds the following: ". . . more or less distinct longitudinal stripes or series of spots on the sides; traces of oblique stripes below eye; . . . soft dorsal dusky, sometimes reticulated, and with a narrow pale margin. The young are more silvery, especially on the lower parts of head and body, and the fins are much paler." Waite (1916) gives a good description of specimens from Macquarie Island: "The general color is olive grey, the lower parts yellow; the markings are black and somewhat irregular, but two oblique bands may be traced below the eye; a branch from the upper one crossing the lower part of the opercle; the rest of the upper parts and sides of the head bear irregular spots and lines; six or seven bands cross the back to below the lateral line, whence they break and form blotches alternating with the bands. The first dorsal is dark and clouded; the second has a dark intramarginal band and a white edge; diagonal bars cross the lower portion, and the clouding leaves lacunae in the membrane; the anal is sooty, but the tips of the rays are lighter; the other fins are also sooty but without markings."

In life the colors appear to be striking, as several authors have noted them. The back may be dark brown, dark grey-green, blue-grey, or rich golden-brown, passing to golden-yellow, cream, or reddish on the belly (the 189 mm. specimen in the Zoological Institute, Leningrad, was orange ventrally in life). The branchiostegal membranes may be bright orange-red or orange-yellow. The underparts of the head may be white, or the throat and jaws may be bright orange-red. The dorsal fins are blue-grey, the other fins grey (Cunningham, 1871; Lönnberg, 1907; Norman, 1937b; Studer, 1879).

The existence of pelagic juveniles in this species, which have been collected some distance from land over great depths, explains satisfactorily the wide distribution of the species and the apparent lack of differentiation between the many seemingly isolated populations. In their general coloration they resemble closely the pelagic young of *N. coriiceps* and *N. rossii*, species which also have wide distributions.

Antarctic specimens. Among the *Notothenia* material which I have examined are 2 large specimens captured well within the Antarctic Zone (Norman, 1938; Andriashev, 1965) which appear to belong with *N. magellanica*. One,

USNM 171000, is from the Ross Sea and the other, in the Zoological Institute in Leningrad, is from the Scotia Sea. Both were collected from near the surface over fairly deep water. These 2 specimens thus present a problem with respect to both habitat and distribution. Information from the literature indicates that, except for the pelagic juveniles, *N. magellanica* is a near shore bottom fish, living among kelp, and that it can be captured with traps, hand lines and seines. Its distribution is primarily Subantarctic, extending into the edge of the Antarctic Zone only at Kerguelen and Macquarie islands. Further, very few species are known to inhabit both the Subantarctic and Antarctic zones. For these reasons the pelagic habit and high Antarctic localities of these 2 specimens suggest that they represent a different species. However, for nearly every character examined they show no differences from Subantarctic material of *N. magellanica,* and it may be that the observed differences are products of their large size. Also, since *N. magellanica* is known to penetrate into the edge of the Antarctic Zone, it may prove to be one more species which inhabits both the Subantarctic and high Antarctic for at least part of the year. For the present, then, I shall consider these specimens as possible representatives of a differing population of *N. magellanica* of unknown taxonomic rank.

Table 1 presents the pertinent measurements and counts taken from the Antarctic specimens together with the ranges of the measurements expressed as thousandths of the Standard Length. Comparison of these data with those taken from the subantarctic material shows that the Antarctic specimens have smaller eyes, a shorter distance between the tip of the snout and the nostrils, a greater distance between the nostrils and the edge of the orbit, a wider interorbital space, a shorter upper jaw, a deeper body, a greater distance between the origins of the second dorsal and anal fins, shorter pectoral and pelvic fins, and more rows of scales about the caudal peduncle.

Besides the above differences, the lowermost gill rakers in the anterior series of the first gill arch are dentigerous and appear similar to those of the posterior series; the caudal fin is distinctly emarginate and each lobe is pointed. Most striking, however, are the presence of ctenoid scales over most of the body. Those covered by, and just above and below, the appressed pectoral fins are strongly ctenoid, while those posteriorly on the sides of the body, anteriorly along the back, especially anterior to the first dorsal fin, and anterior to bases of pectoral fins are more weakly ctenoid. All of the scales on the belly, even anterior to the pelvic fins, are ctenoid.

There are no obvious markings on the body or head. Top and sides of head and upper parts of body a dark grey-brown or bluish black; body shading to paler below, head becoming paler more abruptly along ventral edges of cheeks and opercles, and on lower jaw; the Scotia Sea specimen is very pale orange-pinkish below. First dorsal fin uniformly black; membranes of second dorsal

TABLE 1. *Measurements (in mm.) and counts from two Antarctic specimens of* Nototheni magellanica, *with ranges of measurements expressed as thousandths of the Standard Length.*

Observation	USNM 171000	ZIL Specimen	Range
Measurements			
Standard Length (SL)	229	261	
Length of head (HL)	64.3	68.8	253–281
Width of head (HW)	51.6	—	215
Orbital diameter (O)	12.2	10.1	39–53
Length of snout (Sn)	19.8	22.1	85–86
Snout to nostril distance (Sn-N)	11.1	10.5	40–48
Nostril to nostril distance (N-N)	16.3	18.4	71
Interorbital width (IO)	32.5	35.6	136–142
Length of postorbital part of head (PO)	37.1	—	162
Length of upper jaw (JL)	21.2	24.0	92–93
Length of caudal peduncle (CPL)	27.7	34.9	121–134
Depth of caudal peduncle (CPD)	22.1	21.9	84–96
Dorsal to caudal distance (D-C)	28.6	—	125
Depth of body (BD)	72.6	70.1	269–317
Pectoral to pectoral distance (P-P)	50.2	—	219
Second dorsal to anal distance (D_2-A)	86.7	—	379
Snout to first dorsal (Sn-D_1)	70.5	70.8	271–308
Snout to second dorsal (Sn-D_2)	91.7	99.9	383–400
Snout to anal (Sn-A)	126	141	540–550
Anal to pelvic distance (A-V)	71.5	83.5	312–320
Length of caudal fin (CL)	46.7	48.5	186–204
Length of pectoral fin (PL)	49.9	57.0	218
Length of pelvic fin (VL)	35.8	39.8	152–156
Length of sixth ray of second dorsal fin	30.4	—	133
Length of sixth ray of anal fin	26.4	—	115
Counts			
First dorsal fin (D_1)	4	4	
Second dorsal fin (D_2)	31	29	
Anal fin (A)	25	25	
Caudal fin (C)	16	16	
Pectoral fin (P)	16	16	
Lateral scales (LatSc)	52	53	
Scale rows between lateral line and origin of second dorsal fin (LL-D_2)	10	—	
Scales around caudal peduncle (ScArCP)	30	32	
Upper lateral line (ULL)	37	44 & 45	
Middle lateral line (MLL)	10	2	
Branchiostegal rays (Br)	6	—	
Preoperculo-mandibular pores	10	12 & 10	
Infraorbital pores	8	9 & 8	
Supraorbital pores	4	4	
Temporal pores	6	6	
Supratemporal pores	3	3	
Anterior gill rakers, first arch	4+1+10=15	4+1+11=16	

fin black, the rays pale hyaline, creating the effect of white stripes on a black field. Membranes of anal fin dusky basally, clear hyaline toward margin, the rays pale. Caudal fin dusky, especially along upper and lower edges of rays. Pectoral fins dusky along upper and posterior margins, paler centrally and below; pelvics dusky.

Distribution. *Notothenia magellanica* has been recorded from the Magellanic region; Kerguelan, Macquarie, Aukland, and Campbell islands; and from the South Island of New Zealand. In addition it is recorded here for the first time from Marion Island and 2 localities well within the Antarctic Zone. Except for pelagic juveniles and the 2 far southern records, the species appears to inhabit only very shallow water, as all records (where the information is given) state that specimens were secured by traps, hand lines, or seines. The *Discovery* obtained a few juveniles with dip nets and tow nets from or near the surface in open waters. Kenny and Haysom (1962) state that the species lives among kelp near the shore at Macquarie Island, and Forster (in Bloch and Schneider, 1801; 1844) states that about Tierra del Fuego it lives near the shore among sea weed.

In the Magellanic region *N. magellanica* appears to be restricted to the west coasts of Tierra del Fuego and Patagonia, and the Falkland Islands, a pattern similar to that of several other Subantarctic species. It is probable that adults everywhere are associated with rocky and protected areas near shore.

Discussion. Although Norman (1937b) listed *Gadus magellanicus* Forster (in Bloch and Schneider, 1801) with a sign of interrogation under *Notothenia macrocephala* Günther, he considered Forster's description to be equally applicable to *N. macrocephala* and *N. microlepidota* (*non N. microlepidota* of Hutton, but equals *N. angustata* of Hutton; see discussions under both species). His reasons for this position were that the unpublished drawing of the species by Forster is a rough sketch which, while definitely representing a *Notothenia*, is not of sufficient detail to identify the species, and that the anal fin is described as having 25 rays, a number common to both species. Through the courtesy of Mr. A. C. Wheeler of the British Museum (Natural History) and the Trustees of the British Museum I have been able to obtain a photograph of Forster's drawing which is reproduced here (fig. 1). Although the drawing is obviously unfinished, it shows definitely that *N. macrocephala* is a synonym of *Gadus magellanicus*. The pectoral fin is drawn with an oblique posterior margin and with the upper rays longest, the snout is separated from the top of the head by an abrupt rounding above the nostrils, and the caudal fin is emarginate. These characters are diagnostic for the present species.

Norman (1937b) also lists *Notothenia porteri* Delfin as a synonym of *N. magellanica*, but a careful reading of the description demonstrates that the name is a synonym of *N. angustata*. A full discussion is presented under that species.

FIGURE 1. *Notothenia magellanica.* Reproduction of J. G. A. Forster's unpublished drawing of *Gadus magellanicus,* by permission of the Trustees of the British Museum (Natural History).

A final problem has been the location and designation of the types of *N. maoriensis, N. arguta, N. hassleriana,* and *N. antarctica.*

It would appear that the type of *N. maoriensis* has been lost. In 1965 Miss M. Büchler (now Mrs. M. Darby), then Assistant Zoologist in the Canterbury Museum at Christchurch, New Zealand, informed me that an old register, dating back to the early part of this century or even into the last century, contains the following entry:

"*Notothenia maoriensis* Haast, Trans. N. Z. Inst. vol. 5, p. 276 *N. coriiceps* Hutton, Cat. Fishes N. Z.: 32 (*nec* Richardson) Stuffed (Type lost, originally stuffed)."

Miss Büchler made a thorough search through the fish collection and catalogues and the above entry was the only positive result. Therefore it seems fairly certain that the type is no longer in existence.

A number of fishes, some of which are types, were presented to the British Museum in the 1880's by the Otago Museum in Dunedin, New Zealand. Among them is a specimen labelled as the type of *Notothenia arguta.* Its total length is about 179 mm., which is close to the length of 7¼ inches (equals 184 mm.) given by Hutton in the original description. Dr. D. R. Simmon of the Otago Museum informed me (letter dated 8 April 1964) that "although N. arguta is entered as a name in the register . . . there is no record of a specimen being held by this museum." I therefore conclude that the British Museum specimen is indeed the type.

Notothenia hassleriana was described from an unknown number of specimens collected at 2 localities in the Strait of Magellan. I have examined 2 specimens

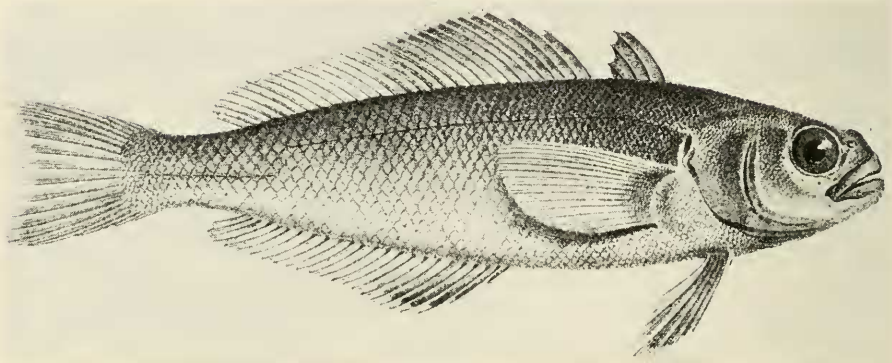

Figure 2. *Notothenia magellanica*, from Steindachner, 1876.

labeled as types, one each from the 2 localities. It is possible that these 2 specimens are all that Steindachner had, for Dr. P. Kähsbauer of the Naturhistorisches Museum in Vienna indicated in letters dated 7 October and 7 November, 1964, that these were all he could find. In any event, the specimen from Port Gallant (register number 59926) is very similar to the illustration published by Steindachner and reproduced here (fig. 2), and I designate this specimen as the lectotype.

Notothenia antarctica was described from a single specimen, 35 cm. long, collected by Dr. Studer during the voyage of the SMS *Gazelle* from Accessible Bay, Kerguelen Island. Dr. C. Karrer of the Zoologisches Museum of Humboldt University in Berlin has written that a specimen identified as *N. antarctica* of the proper size, from the above locality and collected by the *Gazelle* is in the fish collection there. Although it is not labeled as the type, it is undoubtedly the specimen Peters used for his description. Professor Kurt Deckert of the same museum had earlier written that although the register of the fish collection listed the type of *N. antarctica*, he had been unable to find it.

Notothenia rossii Richardson.

Notothenia rossii Richardson, 1844: 9–10, pl. 5, figs. 1 & 2 (original description and illustration; type locality unknown, but probably the Kerguelen Islands (Regan, 1916); type lost); Günther, 1860: 263 (description); Norman, 1937a: 61, 64 (description, separation from *N. coriiceps*); Norman, 1938: 25 (description, illustration, distribution); Blanc, 1951: 495 (listed, food); Blanc, 1954: 191 (listed); Blanc, 1958: 137 (listed, illustration); Blanc, 1961: 123–124 (description); Bellisio, 1966: 69, foto 40 (listed, illustration).

Notothenia rossi Regan, 1913: 240, 276–277 (description); Andriashev and Tokarev, 1958: 199 (juvenile listed).

Macronotothen rossii Gill, 1862: 521 (listed).

Notothenia marmorata Fischer, 1885: 53–55 (original description; type locality South Georgia, probably at about 54°31'S., 36°05'W.; types (2 specimens remain of original

Table 2. *Measurements (in mm.) and counts from the types of* Notothenia macrocephala, N. arguta *and* N. hassleriana. *Abbreviations are as in table 1, with the addition of body width (BW), anterior gill rakers of first gill arch (AntGR) and longest pelvic rays (LongVR). Where two measurements or counts are given, the second is taken from the right side.*

Observation	*N. macrocephala*: BMNH 1860.2.20.2 (Type)	*N. hassleriana*: NMV 59926 (Lectotype)	*N. hassleriana*: NMV 65389 (Paralectotype)	*N. arguta*: BMNH 1886.11.18.28 (Type)
SL	—	86.0	87.0	150
HL	84	24.5	25.4	45.4
O	16	5.7	6.1	9.5
Sn	—	7.5	7.1	13.4
Sn-N	—	4.9	4.5	8.7
N-N	—	4.9	5.2	9.9
IO	36	8.6	9.0	17.6
PO	—	13.1	13.9	23.9
JL	—	9.0	8.6	16.4
CPL	32	10.5	10.3	16.7
CPD	—	8.3	8.4	14.7
BD	—	21.6	22.3	38.7
BW	—	10.5	12.3	22.1
P-P	—	14.8	17.6	30.9
Sn-D_1	—	27.5	27.4	49.0
Sn-D_2	—	36.7	36.3	63.8
Sn-A	—	45.8	45.8	77.5
A-V	—	26.7	24.6	40.5
CL	—	18.4	18.0	29.4
PL	—	21.0	20.1	38.1
VL	—	16.8	16.8	29.8
AntGR	—	5+1+11=17	5+1+10=16	6+1+11=18
D_1	—	4	5	4
D_2	31	30	31	30
A	24	24	24	24
C	—	16	16	16
P	17	16 & 17	16 & 16	17
LongVR	—	3	3	3
LatSc	49	51	54	50
LL-D_2	—	7	6	7
ScArCP	—	27	24	24
ULL	38	41 & 42	40 & 38	38 & 36
MLL	11	9 & 11	10 & 11	9 (?) & 10

3) in Hamburgischen Zoologischen Staatsinstituts und Zoologischen Museums, Hamburg).

Notothenia macrocephala marmorata Lönnberg, 1905: 34–36, 53 (description, spawning); Lönnberg, 1906: 94–95 (description, spawning, food).

Notothenia coriiceps var. *macquariensis* Waite, 1916: 64–66, pl. 5, fig. 3 (original description and illustration; type locality Macquarie Island; lectotype in South Australian Museum, Adelaide); Regan, 1916: 378 (differentiation from *N. coriiceps*); Norman, 1937a: 60–61 (synonymized).

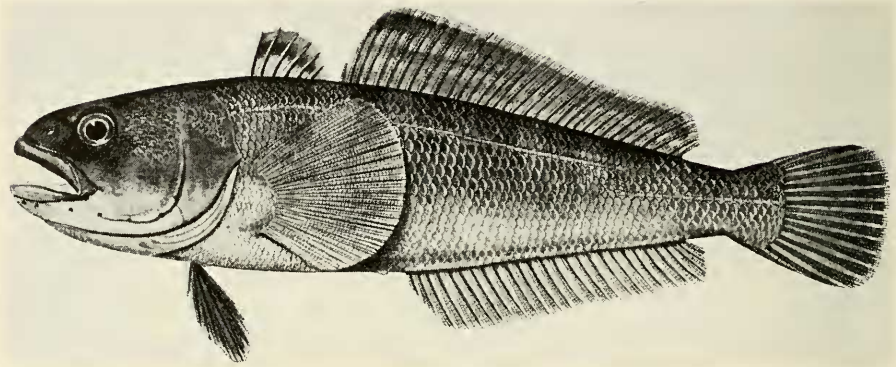

Figure 3. *Notothenia rossii*, from Waite, 1916.

Notothenia rossii marmorata Nybelin, 1947: 22–26 (differentiation from *N. r. rossii*, description, distribution); Nybelin, 1951: 23–27 (description, differentiation from *N. r. rossii*, spawning); Olsen, 1954: 373–382 (description, growth, food, habits); Ruud, 1954: 849 (oxygen capacity of blood); Olsen, 1955: 88 (biology compared to Channichthyids); Ladiges, Wahlert, and Mohr, 1958: 165 (designation of lectotype); Andriashev, 1959: 5 (vertebrae).

Notothenia rossii rossii Andriashev, 1959: 5 (vertebrae).

Material examined. SU 67031: washed up on beach, Macquarie Island (1; 461 mm.; partly eaten and eviscerated).

SAM (uncatalogued): Macquarie Island (1; 342 mm.; lectotype of *N. coriiceps macquariensis*).

The following material has been examined for purposes of comparison with the above Macquarie Island specimens.

BMNH 1937.7.12.563–4: Jetty (probably Government Jetty, Grytviken), South Georgia (2; 129 & 143 mm.).

USNM 107158: Stromness Harbour, South Georgia (1; 208 mm.).

USNM 179080: King George Island, South Shetland Islands (1; 274 mm.).

USC-*Eltanin* Station 671: South-west of South Georgia Island, 54°41′S., 38°38′W.; 220–320 m.; 10-foot Blake trawl (1; 432 mm.).

Description

Body less deep than *N. magellanica*, not becoming much deeper than head; ventral profile curves more evenly than dorsal profile, which rises most steeply in the snout; body compressed posteriorly, but becomes somewhat depressed anteriorly. Length of head 319–323, its width 234–292, its depth 204; depth of body 213, its width 138, dorsal to anal distance 235; pectoral to pectoral distance 219–228; length of caudal peduncle 103–104, its depth 85–91; dorsal to caudal distance 105–109. Vertebrae 20 + 31 = 51.

Snout rises steeply in a smooth curve from lateral view, its length 86–95. Nostrils short tubes with the posterior margin raised into a point, placed 53–63 from tip of snout, 24–25 from orbits, and 63–67 apart. The mouth appears larger than in *N. magellanica,* but the upper jaw extends posteriorly only under anterior edge of pupil; length of upper jaw 130–138; lower jaw projects slightly beyond upper jaw. Eyes directed laterally, placed just below dorsal profile of head; diameter of orbit 51–58. Interorbital region broad and almost flat, both from lateral and frontal views, its width 102–105. Length of postorbital part of head 174–186.

Teeth in both jaws in 2 bands; outer band a single row of somewhat enlarged, evenly spaced, canine-like teeth extending almost full length of jaw, becoming slightly smaller anteriorly and absent near symphysis; inner band lies immediately behind outer row, broad anteriorly, becoming narrow posteriorly, extending posteriorly only ⅓ to ½ length of jaw (upper jaw) or as far as outer row (lower jaw). Tongue free anteriorly, fleshy, but not soft. Oral membranes extend most of length of jaws, papillose only along anterior edges.

Larger gill rakers in anterior series of first gill arch flattened, nondentigerous, and not very elongate, arranged $6 + 0–1 + 13–14 = 20$. Posterior gill rakers of anterior gill arch dentigerous distally on anterior face, arranged $1 + 1 + 11 = 13$ (SAM specimen); gill rakers of remaining arches similar. Branchiostegal rays 6; pseudobranchiae curved ventralward posteriorly.

First dorsal fin 5–6, lower than second dorsal fin, length of longest spine 39–60; its origin 301–332 from tip of snout, from slightly behind to slightly in advance of upper end of base of pectoral fin. Second dorsal fin 32–33 (Waite, 1916, gives 33–34), its origin 406–451 from tip of snout, 31–51 from base of last ray of first dorsal fin; first ray short, heavy and unbranched but segmented; length of sixth ray 101–102, of sixth from last ray 70–86. Anal fin 27–28, its origin 558–562 from tip of snout, beneath bases of rays 8–10 of second dorsal fin; length of sixth ray 81–92, of sixth from last ray 69–77. Caudal fin 14–16, its length 154–173, its posterior margin truncate.

Pectoral fins 22–23, their length 215–223, reaching posteriorly to above base of first ray of anal fin or not reaching to anal fin; middle portion of posterior edge truncate, upper and lower portions rounded; uppermost ray very short, about 48. Pelvic fins inserted 237–330 from origin of anal fin, entirely in advance of bases of pectoral fins; their length 157–160, third, or third and fourth rays longest, not at all reaching to anal fin.

Upper lateral line of body with 40–57 tubular scales, dipping slightly above upper end of base of pectoral fin, ending posteriorly below about fifth to ninth from last rays of second dorsal fin, and separated by about 6–7 scale rows from origin of second dorsal fin. Middle lateral line with 15–17 tubular scales, originating below or a little behind end of upper lateral line and extending a

short distance onto base of caudal fin. Cephalic lateral line system normal in pattern, but pores very small and difficult to see. Preoperculo-mandibular canals with 10 pores, not connected to temporal canals; infraorbital canals with 8–9 pores; supraorbital canals with 4 pores and sharing a coronal pore; temporal canals with 6 pores; supratemporal canal with 3 pores.

Scales in lateral longitudinal series 55–57; 28–29 around caudal peduncle. Scales nonctenoid except for those in area of side of body covered by appressed pectoral fin and a little posteriorly which are weakly ctenoid; scales present everywhere on body except medial (posterior) base of pectoral fin and area immediately adjacent, and an arc along lateral base of pectoral fin; scales extend onto proximal part of caudal fin and onto lateral proximal part of pectoral fin; scales small on belly, ventral area anterior to pelvic fins and on back anterior to first dorsal fin. Scales absent on head except for about upper ½ of cheeks behind eyes, about upper ¼ of operculum, and 2 small patches on each side, one in front of the other, on posterolateral corners of top of head. Head only very slightly rugose, with small raised vermiculations, the most prominent radiating from eyes. Low ridges present, probably associated with parietal and pterotic bones.

Color (in alcohol) of the SAM specimen is dark grey-brown with some blue above, becoming lighter, somewhat yellowish below. Second dorsal fin with dark longitudinal bands, 3 anteriorly, 2 posteriorly, rather irregular anteriorly. The SU specimen is brownish black above, lighter on belly. The second dorsal is marked with somewhat irregular brownish bands which extend posteroventrally in anterior part of fin and more or less parallel with back in posterior part of fin. Anal fin dusky except for a pale margin; caudal fin irregularly and indistinctly mottled. Two faint stripes on head, one extending along edge of upper jaw, the other extending from posteroventral edge of eye to angle of preopercular.

Subspecies. *Notothenia marmorata* Fischer, described from South Georgia, has long been considered a synonym of *N. rossii* since comparison of material from Kerguelen and Macquarie islands with that from the region of the Scotia Sea has shown that the two populations are very similar. Nybelin (1947, 1951) was the first to call attention to differences between specimens from the two regions, and he resurrected the name "*marmorata*" as a subspecies of *N. rossii*. Unfortunately, very little material has been reported from the Kerguelen-Macquarie region (Richardson, 1844; Waite, 1916; Blanc, 1951, 1954, 1961). The most reliable published information is that by Richardson; Waite's 1916 paper contains numerous errors, and his methods of counting differ in some instances from those now in practice; the data given in the papers by Blanc seem to have been copied from reports on Antarctic material and cannot be used. For these reasons the data presented above, although obtained from only 2 specimens, are important additions to our knowledge of the species.

Combining my observations with those of Richardson, it seems possible that

Table 3. *Measurements (in mm.) and counts from two specimens of* Notothenia rossii *from Macquarie Island. Abbreviations are as in table 2. Where two measurements or counts are given, the second is taken from the right side.*

Observation	Lectotype	SU 67031	Observation	Lectotype	SU 67031
SL	342	461	A-V	98.1	152
HL	109	149	CL	52.7	79.8
O	17.5	26.8	PL	73.5	103
Sn	32.5	39.7	VL	54.9	72.3
Sn-N	21.6	24.4	AntGR	6+1+13	6+0+14
N-N	22.8	29.1		=20	=20
IO	36.0	47.1	D_1	6	5
PO	59.5	85.7	D_2	33	32
JL	44.4	63.4	A	28	27
CPL	35.1	48.1	C	16	14
CPD	31.0	39.3	P	22 & 22	23
BD	72.3	—	LongVR	3	3 and 3 & 4
BW	47.1	—	LatSc	57	55
P-P	74.9	105	LL-D_2	7	6
Sn-D_1	103	153	ScArCP	28	29
Sn-D_2	139	208	ULL	57 & 54	40
Sn-A	191	259	MLL	17 & 17	15

the Kerguelen and Macquarie material differ from the Scotia Sea material in having a longer snout (86–95 vs. 75–86), a broader interorbit (102–105 vs. 87–100), a longer upper jaw (130–138 vs. 106–123), a greater distance between the tip of the snout and the origin of the anal fin (558–562 vs. 472–547), fewer rays in the second dorsal fin (32–33 vs. 34–35), fewer vertebrae (51 vs. 52–53), and different coloration. It may be that the proportional differences are due to size, as the 2 Macquarie Island specimens examined are larger than nearly all of those seen from the Scotian region, but the counts and color differences seem to be reliable. In color, specimens from the Scotian region have the sides of the body covered by a series of irregular lines and blotches, with sometimes a dark arc at the base of each pectoral fin and spots on top of the head. The second dorsal is marked in much the same manner as in the Macquarie specimens, but the bands are much more distinct.

For the above reasons I believe there is good evidence for following Nybelin in recognizing as subspecies two populations, one, *N. rossii rossii,* inhabiting the Kerguelen and Macquarie islands, and the other, *N. rossii marmorata*, inhabiting the islands of the Scotia Ridge system, including the South Shetland Islands.

Discussion. In his original description of *N. coriiceps* var. *macquariensis*, Waite stated that the type was in the South Australian Museum, but he did not specifically designate either of the 2 specimens upon which his description was based. I therefore select the specimen from the South Australian Museum listed

under material examined as the lectotype. The second specimen, now presumably in the Australian Museum, Sydney, becomes a paralectotype. I do not know whether the lectotype is the specimen illustrated by Waite, but selecting the specimen in the South Australian Museum accords with Recommendation 74D of the International Code which suggests that a lectotype be selected from the material in the institution containing the largest number of types from the collection worked upon by the original author.

Notothenia angustata Hutton.

Notothenia coriiceps (*non* Richardson) Hutton, 1872: 26 (brief description); Thompson and Anderton, 1921: 94 (listed).

Notothenia cornucola (*non* Richardson) Hutton, 1873: 262–263 (brief description).

Notothenia angustata Hutton, 1875: 315–316 (original description; type locality Dunedin Harbour; type in Otago Museum); Hutton, 1876: 213 (an almost verbatim reprint of the previous paper; localities given as Dunedin and Bluff harbours); Hutton, 1879: 339 (listed, synonymy); Hutton, 1890: 279 (listed); Gill, 1893: 118 (listed); Waite, 1907: 30 (listed).

Notothenia parva Hutton, 1879: 339 (original description; type locality Auckland Islands; types in Dominion, Otago and British Museums); Hutton, 1890: 280 (listed); Gill, 1893: 118 (listed); Waite, 1907: 30 (listed).

Notothenia porteri Delfin, 1899b: 118–120 (original description; type locality Talcahuano, Chile; type (or types) possibly in the old natural history museum in Valparaiso, Chile).

Notothenia microlepidota (*non* Hutton) Boulenger, 1902: 185 (listed); Waite, 1909: 590–594 (description, illustration); Regan, 1913: 277–278 (description); Waite, 1916: 69 (listed); Regan, 1916: 379 (synonymy); Thompson and Anderton, 1921: 94 (listed); MacDonagh, 1936: 428–429 (synonymy); Norman, 1937b: 90–91 (description, synonymy, distribution); Fowler, 1951: 314 (key); Moreland, 1957: 34 (listed); Parrott, 1958: 110–111 (description, variation).

Notothenia latifrons Thompson, 1916: 434–435, pl. 3, fig. 1 (original description and illustration; type locality Sandy Point (Punta Arenas), Strait of Magellan; holotype in U.S. National Museum).

Notothenia macrocephala (*non* Günther) Fowler, 1926: 283 (description).

Notothenia patagonica MacDonagh, 1931: 100 (original description; type locality among the rock ledges of Bahia del Fondo, Golfo San Jorge, Santa Cruz (province), Patagonia (Argentina); holotype in Museo de La Plata); MacDonagh, 1934: 84–91, pl. 10, figs. 2 & 3, pl. 11, figs. 1 & 2, pl. 12 (description, illustrations, scales, systematics).

Material Examined. BMNH 1886.11.18.29: Auckland Islands; from the Otago Museum (1; 71.7 mm.; lectotype of *N. parva*).

BMNH 1886.11.18.30: Dunedin, New Zealand (1; 238 mm.).

BMNH 1936.7.7.4: among the rocky ledges of Bahia del Fondo, Golfo San Jorge, Santa Cruz (province), Patagonia (Argentina) (1; 230 mm.; paratype of *N. patagonica*).

USNM 39670: New Zealand (1; 182 mm.).

USNM 176391: Huiches Island, Chile (45°10′30″S., 73°33′W.) (1; 332 mm.).

MLP 12–XII–30–1: same data as for BMNH 1936.7.7.4 (1; 315 mm.; Holotype of *N. patagonica*).

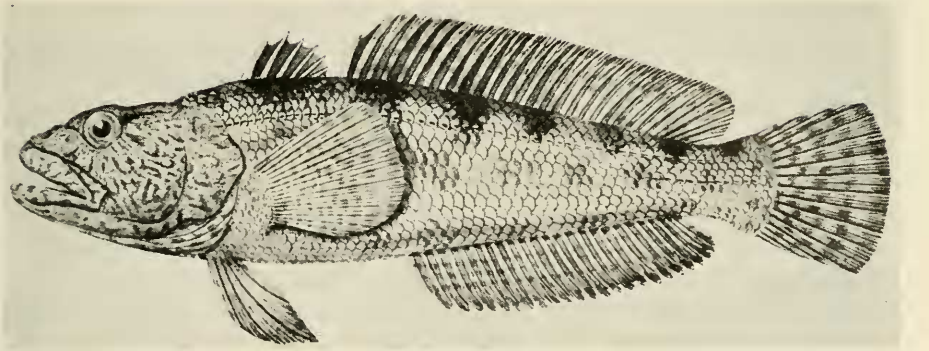

Figure 4. *Notothenia angustata*, from Waite, 1909.

CM (uncatalogued): Ranui Cove, Auckland Island (2; 56.2 and 85.8 mm.).

Selected measurements and counts were taken from the following specimens, all deposited in the Dominion Museum, New Zealand. 2864: Campbell Island (1); 2897: Oreti Beach, Southland (1); 3124: Campbell Island (1); 3332: outer Ranui Cove, Auckland Island (7); uncatalogued: Waitangi, Chatham Island, 43°36.2′S., 176°48.5′W. (3); uncatalogued: Glory Bay, Pit Island, Chatham Islands, shore, 43°47′S., 179°30′W. (1).

Material in the Canterbury Museum (all uncatalogued) from the following localities was also examined. Tucker Point, Port Ross, Auckland Island, under stones (2); west coast of Campbell Island (1); Tucker Cove, Campbell Island, among kelp at low tide (1); Auckland Islands (2); Laurie Harbour, Auckland Island (1); Ranui Cove, Auckland Island (1).

Description. Larger specimens more than usually compressed posteriorly; caudal peduncle distinctly deeper than long. Smaller specimens more cylindrical; caudal peduncle may be longer than deep. In region of bases of pectoral and pelvic fins, body becomes broader and less deep; the head appears depressed and small, although its measured length is similar to those for other species. Dorsal and ventral profiles about equally convex, or the ventral profile, at least of head, may be a little more convex than dorsal profile. Length of head 302–345, its width 187–281, its depth 181–187; depth of body 197–259, its width 140–188; dorsal to anal distance 229–288, pectoral to pectoral distance 189–266; length of caudal peduncle 92–117, its depth 92–125; dorsal to caudal distance 89–125. Vertebrae 17–18 + 27–29 = 44–46.

Snout broad and flattened, its length 84–98, longer than diameter of orbit. In lateral view the snout appears short, but its breadth causes its measured length to be larger. A pair of ridges, through which the supraorbital canals extend, separate the medial and lateral parts of the snout. These ridges curve around

the posterior and medial sides of the nostrils and extend anteriorly to end at the edge of the groove behind the upper lip. In larger specimens the medial portion of the snout is flat and somewhat raised; in smaller specimens the ridges are little developed and the snout is more evenly rounded. The nasal tubes lie in shallow depressions, placed 52–66 from tip of snout, 17–30 from orbit, and 53–64 apart. The posterior half of each tube is raised into a pointed flap which can be used to constrict or close the nasal opening.

Eyes rather small, diameter of orbit 45–82, placed entirely within upper half of side of head, either above or extending slightly below line between tip of snout and upper end of base of pectoral fin, not projecting into dorsal profile of head. Interorbital region very broad, its width 81–104. Ridges of supraorbital canals, described above for snout, are continued through interorbital region on each side above eyes; these ridges are clearly visible on the small specimens. Medial portion of interorbital space flat and covered with elongate or finger-like papillae.

Supraorbital ridges continue onto postorbital part of head as ridges of temporal canals, and extend to above operculum. Upper surface of head behind eyes almost flat, covered with papillae like those of interorbital region; posterior limit of papillae follows posterior line of head medially, but overlies posttemporal bone laterally. Length of postorbital part of head 167–198.

Mouth broad, somewhat oblique, lower jaw projecting slightly; length of upper jaw 123–150, maxillary extending under anterior ¼ to ⅓ of eye; width of jaws 176–180. Teeth all conical, arranged in 2 bands in each jaw. Outer bands uniserial, composed of enlarged, almost canine-like teeth; inner bands broader, especially anteriorly, composed of smaller and more slender teeth. Inner band of lower jaw extends only along anterior ½ of jaw; that of upper jaw extends about full length of jaw. Outer bands of both jaws extend about full length of jaws, that of upper jaw being slightly longer than inner band.

Gill rakers in anterior series of first gill arch short, blunt, somewhat flattened obliquely to long axis of arch and bearing teeth distally; arranged 5–7 + 0–1 + 11–15 = 17–22; in smaller specimens those near angle may be more elongate, bearing teeth along upper edges. Gill rakers of posterior series of first gill arch dentigerous and only slightly flattened at right angles to long axis of gill arch, arranged 0–1 + 0–1 + 10–11 = 11–13; gill rakers of remaining arches similar. Branchiostegal rays 6.

First dorsal fin 4–7, its origin 289–329 from tip of snout, above or slightly in advance of upper end of base of pectoral fin; second spine longest, its length 62–102. Second dorsal fin 27–30, its origin 400–457 from tip of snout and 17–75 from base of last spine of first dorsal fin; length of sixth ray 111–162, of sixth from last ray 97–122. Anal fin 22–26, its origin 505–577 from tip of snout, originating below bases of sixth to eighth rays of second dorsal fin; length

of sixth ray 96–138, of sixth from last ray 85–105. Caudal fin 14–16, its length 157–219, its posterior margin very slightly rounded, almost truncate.

Pectoral fins 17–19, their length 193–240, not extending to origin of or reaching to above first four rays of anal fin, their posterior margins rounded; width of their bases 80–97. Pelvic fins placed 262–346 from origin of anal fin, entirely in advance of bases of pectoral fins, their length 174–217, third or fourth rays longest, not reaching posteriorly to origin of anal fin.

Upper lateral line 45–61, terminating from below fourth from last ray to slightly behind posterior end of base of second dorsal fin, separated from origin of latter by 6–7 scale rows. Middle lateral line 9–18, extending a short distance onto base of caudal fin. Cephalic lateral line canals of normal pattern, the pores very small and difficult to see. Preoperculo-mandibular canals with 9–10 pores, connected to temporal canals; infraorbital canals with 8–10 pores; supraorbital canals each with 4 pores and sharing a median coronal pore; temporal canals with 5–6 pores; supratemporal canal normally with 3 pores, but in 1 specimen the canal is incomplete across the head and consists of a short tube on each side extending dorso-medially from the temporal canals, each with a single pore at its end.

Most scales on body ctenoid, 49–60 in a lateral longitudinal series, 27–31 rows around the caudal peduncle. Parrott (1958) records 61–69 scales in a lateral longitudinal series, but none of the specimens I have examined had counts that high; MacDonagh (1931) gives a lateral scale count of 68 for the holotype of *N. patagonica*, but I count only 60; Thompson (1916) records 67–73 lateral scales. Since Thompson's counts were made along the lateral line, and above it, from the angle of the operculum to the base of the caudal fin, higher counts would be expected. It is probable that the other high counts were made in a similar manner. Nonctenoid scales present on belly and area anterior to bases of pectoral fins; a few may be found along bases of dorsal and anal fins. Scales extend onto basal parts of caudal fin and, except for a narrow naked crescent at bases of pectoral rays, onto lateral bases of pectoral fins. Scales absent directly in front of bases of pelvic fins, but medially they extend to area covered by fold of branchiostegal membrane across isthmus.

Head almost entirely naked; a few scales, some of which may be ctenoid, present at posterolateral corners of head above temporal canals and on either side of supratemporal canal; a larger patch, some being ctenoid, present on upper part of operculum; a still larger patch, all nonctenoid, present on upper part of cheek behind eye; a few scattered scales may be present below eye.

Ground color of BMNH specimen 1886.11.18.30 brown, somewhat lighter, perhaps originally white or yellowish, on belly. Head somewhat darker and greyish above. No prominent markings present on body. Sides of head with darker vermiculations creating a marbled appearance; these markings continued

onto lateral parts of snout, lips, lower jaw, and faintly onto branchiostegal rays. All vertical fins more or less uniformly brownish-dusky; second dorsal fin with indistinct and irregular darker brown markings on rays; anal fin with 1 or 2 series of darker markings on rays, tending to form horizontal lines. Rays of pectoral fins with brown spots, arranged to form bars on left side, but irregular on right side; pelvic fins with faint marbling similar to that on sides of head.

The USNM specimen from New Zealand is nearly entirely a uniform dark grey-brown. The larger of the 2 Canterbury Museum specimens has on the body irregular light areas over a dark background. The head is uniformly dark above and on the snout, but on each cheek is a series of 4 light lines, partially broken into spots, which radiate from the ventral and posterior parts of each eye; irregular light spots are present on the operculum. The vertical fins are generally dark; the second dorsal fin has 1 to 3 light spots along its rays creating horizontal lines, most distinct anteriorly and basally; the anal fin shows light areas, irregularly arranged anteriorly, horizontally arranged posteriorly; tips of rays of second dorsal and anal fins pale. The pectoral fins show only faint barring and spotting. The smaller specimen is essentially the same as the larger, but the light areas on the sides of the head are larger and less broken.

Little has been recorded of life colors. Hutton (1875; p. 316) gives "Variable in color from dark olivaceous black to olive-green, slightly mottled with blackish on the back; lips speckled with white; axil of pectorals yellow; caudal and dorsal blackish." In his description of *N. porteri* Delfin (1899b; pp. 119–120) gives some color notes for the South American representatives of the species. The color of the iris is reddish yellow and the conjunctiva is green speckled with greenish yellow spots. The cheeks are described as hoary, with a scaled appearance due to the coloration, which probably refers to the dark vermiculations described above, which do sometimes look like scales. Most of the body is a greenish brown, with blackish overtones above, becoming paler ventrally; there also may be 1 or 2 longitudinal bands. Rays of pectoral fins with yellow spots, largest basally; the axil is yellow. Membranes of dorsal and anal fins dusky green, with spots of two shades of greenish yellow. Caudal fin greenish brown with a pale vertical band.

Distribution. I can find no essential differences between the New Zealand and South American material and I therefore concur with Norman (1937b; p. 91) that specimens from the two areas represent the same species. Such a broad distribution is not surprising when one considers the broad distributions of other closely related species (*N. coriiceps*, *N. rossii*, and *N. magellanica*), all of which have characteristic pelagic young. Although no pelagic juveniles of this species have been found, it is probable that they do exist. Night-light fishing in the waters east of New Zealand might prove fruitful, for many pelagic juveniles of the other three species have been obtained in this manner.

Discussion. The use of the specific name *"angustata"* for this species and the inclusion of *Nototheniа porteri* in its synonyny represents a radical departure from the interpretations of all workers since Hutton's time. My reasoning is as follows.

Probably no one took the trouble to read Delfin's description carefully, for the number of spines and rays in the dorsal and pectoral fins, and the color description, which have been abstracted and brought together above, clearly indicate that the species cannot be *N. magellanica* (D_1 4–6; D_2 28–30; P 18–19 in *N. porteri* vs. D_1 3–6; D_2 29–31; P 16–18 in *N. magellanica*).

The realization that something was amiss in the interpretations of Hutton's work by later authors came as a result of attempting to place the various early names applied to New Zealand nototheniids with the 5 species recognized from the area by Parrott (1958). Although it became clear that Hutton had himself confused species, certain important discrepancies were found between his descriptions of *N. angustata* and *N. microlepidota* and the species to which the names were applied. These include fin ray counts, scale counts, color, and shape of the caudal fin. I concluded that the name *Nototheniа angustata* should apply to the species which has been called *N. microlepidota* by all authors since Hutton's time, and that the latter name should apply to the species which have been called *N. colbecki* and *N. filholi* (see discussion under *N. microlepidota*). The confusion can probably be traced back to the 1880's, when a number of fishes were given to the British Museum by the Otago Museum, including some type material. Among these fishes is a specimen identified as *N. microlepidota* which, although never labeled as such, was presumed to be the type (see Norman, 1937b; p. 89). I have examined this specimen (BMNH 1886.11.18.30) and it does belong with the species described here. Boulenger (1902; p. 185) was the first to apply the name *N. microlepidota* to the present species and, because he gave in the same paper an excellent description of the true *N. microlepidota* under the new name *N. colbecki*, all later authors followed him.

In an effort to obtain further and better evidence to support my belief that Hutton's species had been confused, I wrote to the Otago Museum in Dunedin, New Zealand. Dr. D. R. Simmon of that institution was kind enough to locate the *Nototheniа* material in the museum and to discover that the types of *N. angustata* and *N. microlepidota* are probably there. Although there are no data which demonstrate that the Otago Museum specimens definitely are the types, the circumstantial evidence is very strong. In his 1876 paper, which redescribes both *N. angustata* and *N. microlepidota,* Hutton stated that the types of both species were in the Otago Museum. Further, the lengths given by Hutton are close to those measured by myself on the stuffed specimens, my measurements being greater for both species (*N. angustata*: Hutton's length "about 14.5 inches," equals 368 mm.; my measurement, TL = 407 mm.; *N. microlepidota*:

Hutton's length "about 17 inches," equals 432 mm.; my measurement 492 mm.). Mr. P. O'Brian, the preparator at the Otago Museum, stated that the process of stuffing tends to lengthen specimens slightly, and this may account for the apparent greater size of the stuffed specimens. There are other discrepancies between the original accounts and my own data, the most serious being the pectoral count of 18 for *N. microlepidota* (I counted 21 rays). This count is difficult to make on large specimens, however, because of thick investing skin, and I can only conclude that Hutton's count is in error. The same may be said for my scale counts, which were made with difficulty because of the heavy lacquer with which the specimens are coated. Other differences between Hutton's published accounts and my own observations include dorsal and anal fin ray counts.

Whether one believes, as I do, that the specimens in the Otago Museum are the types, or because of the above discrepancies one believes that they are not, the interpretations of Hutton's species by Boulenger, Waite, Norman, and Regan are untenable. *Notothenia angustata* is described as having "a bony ridge over each eye extending back to the posterior margin of the praeoperculum," the "Caudal rounded," the "Lips speckled with white," 19 rays in the pectoral fin and 52–58 scales in a lateral longitudinal series. The supraorbital ridges, rounded caudal fin and number of rays in the pectoral fin clearly distinguish it from *N. magellanica* and demonstrate that it is the same as the *N. microlepidota* of the above authors. Hutton described *N. microlepidota* as having 91 scales in a lateral longitudinal series, 12 scale rows between the origin of the second dorsal fin and the upper lateral line, and a truncate caudal fin. These characters are all incompatible with the species which has been called *N. microlepidota* and show its identity with *N. colbecki* and *N. filholi* (see discussion under *N. microlepidota*). Finally, the name "*microlepidota*" certainly refers to the small and numerous scales implied by the high counts given in the original description, and which is most inappropriate if the conventional interpretation of the 2 species is accepted. Table 4 presents the data for the types of *N. angustata* and *N. microlepidota*, together with those for the types of other species synonymized with them.

I have seen the holotype of *N. latifrons* (USNM 76854), but it is not in good condition and I did little with it. Thompson's description of the species seems good, and since the upper lateral line count of 51–56 is diagnostic for this species I again concur with Regan (1916) and Norman (1937b) that *N. latifrons* belongs in the synonymy of *N. angustata*.

Notothenia parva was described from 4 specimens ranging in size from 3 to 3½ inches in length (equals 76–89 mm.). I have been able to locate three of these specimens, which are now deposited in 3 different institutions: the British Museum, the Dominion Museum, and the Otago Museum. Since the specimen in the British Museum is not mounted in gelatine or on a glass plate and is the

most accessible, I designate it as the lectotype, the two others thereby becoming paralectotypes.

The only remaining nomenclatural problem concerning this species is the identity of *N. maoriensis* Haast, which has priority over the name "*angustata.*" However, it is not possible to determine without any doubt whether the original description applies to *N. magellanica* or to the present species. Characters which indicate an identity with *N. magellanica* are the first dorsal fin with only 3 spines, the lack of any mention of supraorbital ridges on the head, and the dark coloration and lack of any speckling on the head. Characters which indicate an identity with *N. angustata* are scales present below the eye, the posterior end of the upper lateral line ending below the last ray of the second dorsal fin, and the shape of the pectoral fin as shown in the figure published with the original description. The illustration might constitute conclusive evidence except that it is a relatively crude drawing and contains some obvious errors which indicate it was not made with care. In the description the second dorsal fin is said to have 29 rays; the drawing shows only 27, and the membranes are drawn in a manner not found in any specimens belonging to *Notothenia.* The pelvic fins are drawn with a spine and 6 rays with the first ray longest; I have never examined a specimen of *Notothenia* with 6 pelvic rays, and the third or fourth rays are longest, never the first. For these reasons I cannot trust the shape shown for the pectoral fin. Further, large specimens of *N. magellanica* have a number of low papillae below and behind the eyes, many of which are broad and flattened and appear similar to scales. It is possible that these were mistaken for scales by Haast.

To conclude, there is enough doubt concerning the identity of *N. maoriensis* to make me follow Regan and Norman in placing it with *N. magellanica.*

Notothenia microlepidota Hutton.

Notothenia microlepidota Hutton, 1875: 316 (original description; type locality Dunedin and Moeraki (45°23'S., 170°52'E.), New Zealand; holotype in Otago Museum, Dunedin); Hutton, 1876: 213 (virtual reprint of 1875 original description); Hutton, 1879: 339 (listed with counts); Hutton, 1890: 280 (listed); Gill, 1893: 118 (listed); Waite, 1907: 30 (listed); Fowler, 1945: 130 (listed).

Nototoenia filholi Sauvage, 1880: 228 (original description; type locality Campbell Island; types in Museum National d'Histoire Naturelle, Paris); Filhol, 1885: 345 (reprinting of Sauvage's description).

Notothenia filholi Dollo, 1904: 127 (listed); Vaillant, 1907: 22–23 (redescription of syntypes; correction of errors made by Sauvage); Regan, 1913: 278 (description from Vaillant and Sauvage); Phillipps, 1927a: 13 (listed); Phillipps, 1927b: 44 (listed); Blanc and Hureau, 1962: 341–342 (disposition of syntypes).

Notothenia colbecki Boulenger, 1902: 185, pl. 16 (original description and illustration; type locality Campbell Island; types in British Museum); Waite, 1907: 30 (listed); Waite, 1909: 594–595 (description); Regan, 1913: 278 (description); Waite, 1916: 70 (listed); Regan, 1916: 378 (distribution); Rendahl, 1925: 6 (listed); Phillipps, 1927a: 13

TABLE 4. *Measurements (in mm.) and counts from the types of* Notothenia angustata, N. microlepidota *and of some specimens bearing names considered as synonyms of them. Abbreviations are as in table 2. Where two measurements or counts are given, the second is taken from the right side, except for LongVR, where two figures indicate two rays are equally long.*

Observation	*N. angustata*: (Type)	*N. parta*: BMNH 1886.11.18.29 (Lectotype)	*N. patagonica*: MLP 12-XII-30-1 (Holotype)	*N. patagonica*: BMNH 1936.7.7.4 (Paratype)	*N. microlepidota*: (Type)	*N. fitholi*: PM A2384 (Paralectotype)	*N. fitholi*: PM A2384 (Lectotype)	*N. colbecki*: BMNH 1901.11.8.72–74 (Paralectotype)	*N. colbecki*: BMNH 1901.11.8.72–74 (Paralectotype)	*N. colbecki*: BMNH 1901.11.8.72–74 (Paralectotype)	*N. colbecki*: BMNH 1901.11.8.70–71 (Lectotype)	*N. colbecki*: BMNH 1901.11.8.70–71 (Paralectotype)
SL	348	71.7	315	230	424	126 (about)	151 (about)	111	102	73.1	331	196
HL	118	23.3	96.3	75.4	144	—	43.5	33.5	31.5	22.8	105	62.5
O	—	5.7	14.2	12.4	—	9.0	9.2	6.8	6.8	5.6	16.9	11.7
Sn	—	6.0	28.5	22.5	—	—	12.6	9.2	8.7	5.9	30.7	17.2
Sn-N	—	3.7	18.3	13.9	—	—	7.7	5.6	5.2	3.5	19.6	10.5
N-N	—	4.1	17.2	13.9	—	—	7.8	5.8	5.5	4.2	20.8	12.2
IO	36.3	5.8	26.6	22.4	45.2	9.6	11.1	9.0	8.2	5.8	34.0	19.2
PO	—	12.1	—	44.0	—	20.7	23.3	18.0	16.6	11.5	61.3	35.0
JL	—	9.2	43.2	34.6	—	—	15.7	11.7	11.8	8.5	39.0	22.2
CPL	—	7.4	31.0	24.2	—	17.2	—	13.9	13.2	9.9	42.2	24.1
CPD	—	7.3	29.1	24.6	—	10.4	—	8.8	8.6	5.9	30.0	15.5
BD	—	15.1	61.0	52.6	—	25.4	—	21.4	21.1	13.3	76.6	39.2
BW	—	10.5	48.4	39.4	—	14.9	—	15.3	14.0	8.4	62.8	26.1
P-P	—	13.6	—	61.1	—	17.4	—	18.9	17.7	10.6	85.7	39.4
Sn-D_1	—	23.1	91.1	71.7	—	—	44.5	35.0	32.8	23.9	106	61.3
Sn-D_2	—	32.8	126	102	—	—	—	50.4	46.7	33.7	154	89.2
Sn-A	—	37.8	171	116	—	—	—	58.5	54.1	37.1	177	108

TABLE 4. (*continued*)

Observation	*N. angustata*: (Type)	*N. parva*: BMNH 1886.11.18.29 (Lectotype)	*N. patagonica*: MLP 12-XII-30-1 (Holotype)	*N. patagonica*: BMNH 1936.7.7.4 (Paratype)	*N. microlepidota*: (Type)	*N. filholi*: PM A2384 (Paralectotype)	*N. filholi*: PM A2384 (Lectotype)	*N. colbecki*: BMNH 1901.11.8.72–74 (Paralectotype)	*N. colbecki*: BMNH 1901.11.8.72–74 (Paralectotype)	*N. colbecki*: BMNH 1901.11.8.72–74 (Paralectotype)	*N. colbecki*: BMNH 1901.11.8.70–71 (Lectotype)	*N. colbecki*: BMNH 1901.11.8.70–71 (Paralectotype)
A-V	—	20.4	93.8	67.4	—	38.4	—	31.3	30.0	19.5	104	53.5
CL	—	14.1	—	39.4	—	—	—	19.2	19.0	15.8	57.4	36.0
PL	—	17.2	60.8	46.6	—	27.0 & 26.5	28.7	23.2	21.1	17.0	66.2	38.2
VL	—	15.6	55.0	41.2	—	21.3	23.6	20.1	19.1	—	54.4	34.3
AntGR	—	6+0+13 = 19	6+1+12 = 19	5+1+13 = 19	—	—	—	9+1+18 = 28	—	—	8+1+19 = 28	9+1+19 = 29
D_1	6	7	6	5	6	6	6	8	7	7	7	7
D_2	28	29	29	29	29	29	about 27	27	27	27	27	27
A	25	25	24	24	23	about 24	23	23	23	24	23	23
C	—	15	—	16	14	14	14	about 14	14	14	14	14
P	19	18 & 17	18 & 18	18 & 17	21	20	21	20	20	20 & 21	20 & 20	20 & 20
LongVR	4	3 & 4	—	3 & 4	2 & 3	3	3	3	3	—	3	3
LatSc	52	51	60	59	about 80	about 90	about 87	98	96	89	88	84
LL-D_2	—	7	—	6	—	—	10	10	10	11	11	10
ScArGP	—	28	31	28	—	—	—	40	45	43	39	41
ULL	52 & 55	54 & 52	55 & 53	59 & 56	about 71	73	72	70	71	75 & 74	67 & 67	74 & 72
MLL	12	14 & 14	16 & 12	12 & 12	—	about 30	about 30	28 & 32	35 & 32	36 & 37	34 & 34	32 & 32

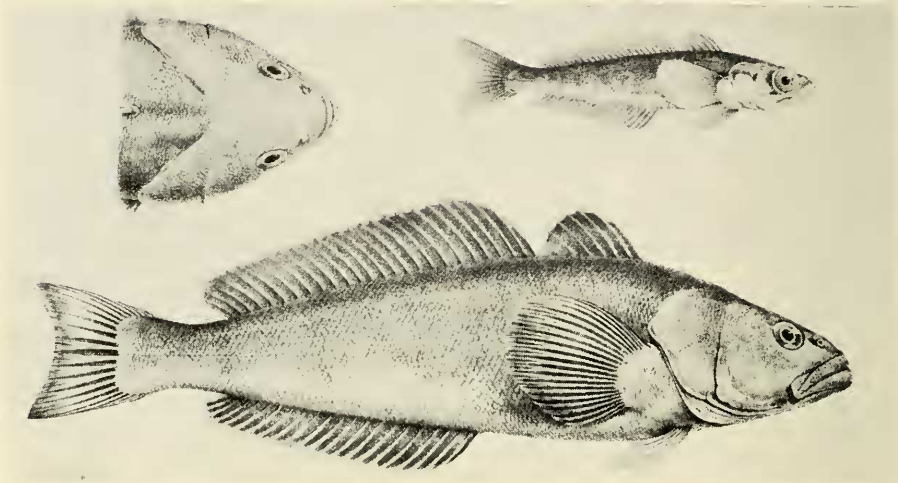

FIGURE 5. *Notothenia microlepidota*. Lateral view and top of head of adult, and lateral view of young; from Boulenger, 1902.

(listed); PHILLIPPS, 1927b: 44 (listed); NORMAN, 1938: 27 (distribution); PARROTT, 1958: 112–113 (description).

MATERIAL EXAMINED. PM A2384: Campbell Island (2; about 126 and 151 mm., not in good condition; paralectotype and lectotype, respectively, of *N. filholi*).

BMNH 1901.11.8.70–71: Campbell Island (2; 196 and 331 mm.; paralectotype and lectotype, respectively, of *N. colbecki*).

BMNH 1901.11.8.72–74: Campbell Island (3; 73.1–111 mm.; paralectotypes of *N. colbecki*).

DM 2734: Campbell Island (4; 111–141 mm.).

The following New Zealand material was also examined, but not used for descriptive purposes.

In the Dominion Museum: 1413, Tucker Cove, Campbell Island (1); 2084, off Big South Cape Island (1); 3123, off rocks in N. W. Bay, Campbell Island (1); 3333, outer Ranui Cove, Auckland Island (2).

In the Canterbury Museum (uncatalogued): Campbell Island (3); Perseverance Harbour, Campbell Island, from throat of Shag (1); Perseverance Harbour, Campbell Island (1); Penguin Harbour, Campbell Island (1); Auckland Islands (2).

DESCRIPTION. Body fusiform, compressed throughout, including head (except in largest specimen); dorsal and ventral profiles nearly evenly curved throughout, a little more strongly so anteriorly, dorsal profile sometimes slightly

more convex than ventral profile; caudal peduncle distinctly longer than deep. Length of head 288–341, its width 126–247, its depth 164–182; depth of body 182–232, its width 115–190, pectoral to pectoral distance 138–254, dorsal to anal distance 196–254; length of caudal peduncle 123–137, its depth 79–91; dorsal to caudal distance 124–144. Vertebrae 18 + 27–28 = 45–46.

Snout smoothly rounded from both lateral and dorsal views, rising from tip of upper jaw at about same angle as top of head; its length 81–100. Nostrils tubular, elliptic in cross section, each with its hind margin raised into a flap ending in a rounded point; nostrils placed 48–69 from tip of snout, 17–23 from orbit, and 52–63 apart.

Eyes directed laterally, placed high on head, above a line between tip of snout and upper end of base of pectoral fin, but not protruding into dorsal profile of head; diameter of orbit 51–77. Interorbital space broad and nearly flat, only very slightly convex, its width 66–103. Length of postorbital part of head 154–185.

Mouth oblique, lower jaw projecting slightly in front of upper jaw; length of upper jaw 104–128, maxillary extending posteriorly under first third of eye. Teeth in upper jaw may be described for convenience as being in 2 bands; outer band a uniserial row of enlarged, spaced (canine-like) teeth, extending only along anterior half of jaw; inner band composed of smaller, more closely spaced teeth, slightly broadened anteriorly, becoming a uniserial row posteriorly; inner teeth become slightly larger posterior to point where outer row ends. Teeth in lower jaw may be described as occurring in a single band, somewhat broadened anteriorly, with outermost teeth largest, and becoming a uniserial row of enlarged teeth in posterior two-thirds of jaw, the teeth becoming smaller posteriorly. Oral valves extend nearly entire length of jaws; they may be covered with papillae or not. Tongue rounded and free anteriorly, with a slight depression in its upper surface, and covered with scattered low papillae.

Gill rakers in anterior series of first gill arch slender and elongate, arranged 6–11 + 0–1 + 15–19 = 24–30; those on lower limb near angle slightly flattened on ventral edge, those further below flattened dorsoventrally, those on upper limb more cylindrical; all bear a few to many teeth, those on lower limb near angle with fewest. Posterior gill rakers of first arch short and blunt, somewhat flattened dorsoventrally, and bearing teeth; arranged 1–3 + 1 + 14–15 = 17–19. Branchiostegal rays 6.

First dorsal fin 6–8, its origin 295–338 from tip of snout, from above upper end to just in advance of bases of pectoral fins; its height relatively low, length of longest spine 86–110. Second dorsal fin 25–29, its origin 413–467 from tip of snout, 28–48 from base of last spine of first dorsal fin; highest anteriorly, length of sixth ray 105–130, of sixth from last ray 75–79. Anal fin 21–24, its origin 507–570 from tip of snout, below bases of rays five to seven of second dorsal

fin; highest anteriorly, length of sixth ray 88–111, of sixth from last ray 76–87. Caudal fin 14, its length 173–216, its posterior margin distinctly emarginate, almost forked. Although the sample counted is small, the apparent lack of variation in the number of principal rays may be due to the emarginate shape of the fin, in which the principal unbranched rays are nearly as long as the longest branched rays and form most of the upper and lower edges of the fin.

Pectoral fins 20–21, their length 190–232, not reaching to, or extending as far as, above fourth ray of anal fin, the posterior margin rounded; width of their bases 66–88. Pelvic fins placed 251–314 from origin of anal fin, entirely in advance of bases of pectoral fins; their length 156–197, third ray longest, not reaching posteriorly to origin of anal fin.

Upper lateral line with 61–75 tubular scales, ending below last few rays of second dorsal fin or extending a short distance posterior to it, separated from origin of second dorsal fin by 9–11 scale rows. Boulenger (1902; p. 185) gives a range of 59–71, but his counts are low in every case. Table 4 presents my counts from the same specimens (see under discussion), which range from 67–75. Middle lateral line with 24–37 tubular scales, originating below ninth to fifteenth rays of second dorsal fin, and extending onto base of caudal fin.

Cephalic lateral-line canals normal in pattern except that preoperculo-mandibular canals are joined to temporal canals. The pores are small and difficult to find. Preoperculo-mandibular canals with 9–10 (usually 9) pores, connected to temporal canals at areas of second pores of latter canals; infraorbital canals with 9–11 (usually 10) pores; supraorbital canals each with 4 pores and sharing a median coronal pore; temporal canals with 6 pores; supratemporal canal with 2–4 (usually 3) pores.

Scales everywhere small, 84–98 in a lateral longitudinal series, with 37–45 rows around caudal peduncle; on body ctenoid except dorsally anterior to first dorsal fin, anterior to bases of pectoral fins, on ventral surface anterior to pelvic fins, and sometimes on lower sides of body between pelvic fins and anterior few rays of anal fin. A few nonctenoid scales may be found scattered among the ctenoid scales, especially at base of caudal fin, and the number of ctenae may be reduced to one. Scales extend onto basal parts of caudal fin and, except for a naked arc at bases of rays, onto exposed proximal portions of pectoral fins.

Most of head naked; 2 patches of scales, some of which are ctenoid, present on each side at posterolateral corners of head, one just anterior to supratemporal canal, the other in triangle formed by temporal canal, supratemporal canal and very weak ridge of posttemporal bone. An elongate patch of nonctenoid scales present on uppermost part of operculum; a patch of similar scales present on upper and anterior part of cheek, extending ventrally and anteriorly in a narrowing arc around posterior and ventral margins of eye. Upper portions of head, including snout, lips, and naked parts of cheeks, as well as other parts in lesser

degree, covered with scattered and low papillae or ridges, the most marked being on top of head and anterior parts of lower lip and jaw.

Ground color of body (in alcohol) uniformly brownish or greyish, becoming lighter ventrally; lower half of body may be somewhat silvery (this probably reflects the method of initial fixation). Both dorsal fins dusky to deep brown; anal fin pale to brown; pectoral fins slightly brownish basally; pelvic fins a little dusky distally; caudal fin slightly dusky. Upper surface of head and tip of lower jaw dark, head otherwise becoming lighter ventrally; lower halves of operculum and cheek may be silvery. Indistinct and irregular dark areas may be present on top of head; a dark patch may be present behind eye at level of upper end of preopercular. Two dark lines may be present on lower parts of cheek, one extending from edge of upper jaw above end of maxillary posteriorly and ventrally towards lower margin of preopercular, the other extending from ventral margin of eye towards angle of preopercular. A third line, extending from posteroventral edge of eye to upper end of preopercular, may be present, and the dark patch behind the eye mentioned above may represent this line.

Juvenile specimens are somewhat silvery in color and, although there are no striking color changes between the young and adults as seen in *N. rossii*, the silvery color may indicate that the young of this species are also pelagic in habit.

Little has been recorded of life colors. Hutton (1875) gives "Purplish brown above, greyish below; throat, gill-membranes, axil of pectorals, and opercles yellowish." Parrott (1958) notes that a specimen from Auckland Island was dark olive-green with dark red bands on the dorsal and ventral fins.

Distribution. *Notothenia microlepidota* is known only from the New Zealand region, including Macquarie Island. Its habits are apparently similar to those of *N. angustata*, specimens having been captured primarily with hooks and lines close to shore.

Discussion. Since the nomenclature and synonymy used for this species are totally different from those used by previous authors, some explanation of the present usage is desirable. My first suspicion that the names *N. filholi* and *N. colbecki* represented the same species was entertained upon reading the account by Filhol (1885; pp. 343–346) of his fishing efforts at Campbell Island. He stated that *N. filholi* was the most common fish encountered there. Boulenger later described *N. colbecki*, also from Campbell Island, and it subsequently was found to be very common there, whereas *N. filholi* was never recorded again. Boulenger's description is good and it was accompanied by an excellent figure; *N. colbecki* was therefore easily recognized by subsequent workers. Sauvage's description, on the other hand, is not only brief, but con-

tains a number of important errors (see Vaillant, 1907; p. 22, footnote), and no illustration was prepared. Thus *N. filholi* was never again recognized, although the name continued to be included in keys and check lists because of the unusual counts which Sauvage had given. Vaillant (1907) corrected Sauvage's errors, but his redescription and discussion has been disregarded. Regan (1913), apparently not knowing what to believe, gave the data of both Sauvage and Vaillant; later authors followed Sauvage.

Through the courtesies of Dr. Maurice Blanc of the Museum National d'Histoire Naturelle, Paris, and of Mr. A. C. Wheeler and Dr. P. H. Greenwood of the British Museum (Natural History) I have been able to examine 2 syntypes of *N. filholi* and 5 syntypes of *N. colbecki*. Although the specimens of *N. filholi* are not in good condition, I was able to take some counts and measurements from them. These are presented in table 4 together with the more complete data from the specimens of *N. colbecki*. There is no doubt that they all represent the same species, and the data from them have been incorporated into the above description.

I have related already the probable cause of the confusion attending Hutton's species *N. angustata* and *N. microlepidota* (see discussion section under *N. angustata*). Although there is some doubt whether the specimen in the Otago Museum thought to be the type of *N. microlepidota* is indeed the type, since there are no records or catalogues dating back to the 1870's, the original description leaves no doubt that Hutton's species is the same as both *N. filholi* and *N. colbecki*. The supposed type is now stuffed, and while its total length is somewhat greater than that recorded by Hutton, it is sufficiently near Hutton's figure that the difference can be accounted for by the process of stuffing. The counts taken from the specimen are presented in table 4 for direct comparison with those from the types of *N. filholi* and *N. colbecki*, and show conclusively that the specimen, whether type or not, represents the same species as the others.

A final matter is the selection of lectotypes from the type series of *N. filholi* and *N. colbecki*. As the lectotype of the former name I choose the specimen of 151 mm. standard length (Paris Museum number A2384) listed above in the material examined. This is as nearly as I can tell the specimen which Vaillant used for his table (1907; p. 23) and is probably the specimen referred to by Sauvage in his original description when he gave a length of 350 mm. (corrected to 150 mm. by Vaillant, 1907; see also Blanc and Hureau, 1962; pp. 341–342). For the lectotype of the name *N. colbecki* I choose the specimen of 331 mm. standard length (British Museum number 1901.11.8.70–71) listed above in the material examined. This is the largest of the specimens which remain of the type series, and is probably the specimen used for the figure of the adult published with the original description (there is some doubt because the legend for the plate states that the figure has been reduced

to ⅓, which would mean the specimen was a little over 500 mm. in standard length; if the above specimen was used for the illustration the reduction is about ½). Boulenger also gives in his description a total length of 380 mm., which corresponds well with both Norman's (1938; p. 27) and my measurements (385 and 388 mm., respectively) for the largest specimen in the series, and indicates that this specimen was considered as the type. Only 5 of the original 12 specimens of the type series remain, and they are undoubtedly the 5 specimens Boulenger used for his table of counts and measurements (Boulenger's total lengths: 380, 230, 130, 120 and 85; my measurements: 388, 232, 130, 121 and 89).

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